Amendments to the Drawings

The attached sheets of drawings 3/6 & 4/6 include changes to FIGS. 3 & 4A. These sheets replace original drawing sheets 3/6 & 4/6 with the corresponding figures. In FIG. 3, reference numeral 341 is added, while in FIG. 4A, reference numerals 334, 335, 401 & 341 are added.

Attachments: Replacement Sheet 3/6;

Replacement Sheet 4/6;

Annotated Sheet 3/6 showing changes; and

Annotated Sheet 4/6 showing changes.

Remarks

Entrance of this Amendment and allowance of all remaining claims are respectfully requested. Claims 1, 5-9, 11, 13-16 & 18-20 remain pending.

By this paper, independent claims 1, 11 & 16 are amended to more clearly point out and distinctly claims certain aspects of the present invention. These claim amendments are submitted in a *bona fide* attempt to further prosecution of the application. Support for the amended language can be found throughout the application as filed, including, for example, canceled dependent claims 2-4, 10, 12 & 17, as well as FIGS. 3-5 and the supporting discussion thereof in paragraphs [0021] – [0025]. No new matter is added to the application by any amendment presented.

Claim Objections:

As noted, Applicants have canceled claims 10 & 17, with the subject matter thereof having been incorporated into the respective independent claims 1 & 16. The cancellation of claims 10 & 17 renders the claim objections moot.

37 C.F.R. §1.83(a):

Noted in the Office Action is a drawings objection regarding the first and second heat transfer surfaces as well as the main planar surfaces. In response to this drawing objection, Substitute Formal Drawing sheets 3/6 & 4/6 are submitted herewith. In FIG. 3, a planar surface of system cold plate 340 is labeled with reference numeral 341. This planar main surface 341 of cold plate 340 is an example of the "second planar heat transfer surface" recited in the claims. Further, FIG. 4A is revised to add reference numerals 334, 335, 401 & 341 as shown in the Annotated and Replacement sheets 4/6. Reference numeral 334 is a planar main surface of cold plate 335, and is referred to in the claims as the "first planar heat transfer surface". In view of these amendments, Applicants respectfully submit that the surfaces and cold plates recited in each of the pending claims are depicted and annotated to describe the exact elements as recited. Based on these amendments, withdrawal of the drawings objection is respectfully requested.

35 U.S.C. §112:

Claims 4-7 & 10 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed to any extent deemed applicable to the amended drawings, specification and claims presented herewith.

In addition to the above-noted drawing amendments, specification paragraphs [0021] & [0023] – [0025] are amended to more clearly describe the assemblies of Applicants' invention depicted in FIGS. 3-5. These specification amendments are also submitted to clarify and relate certain pending claim language to the particular embodiments depicted in the drawings and described in the specification.

In particular, paragraph [0021] is amended to specify that the heat rejection cold plate 335 of FIGS. 3 & 4A is a "first fluid cold plate" as recited in the appended claims, while the system cold plate 340 is a "second fluid cold plate" as the term is employed in the appended claims. Further, paragraph [0021] is amended to specify that the depicted pressure plate 338 is an L-shaped pressure plate 338 as shown in FIG. 3, and that the planar main surface 334 depicted in FIG. 4A of cold plate 335 is a "first planar heat transfer surface" as employed in the appended claims, while planar main surface 341 of system cold plate 340 is a "second planar heat transfer surface". As explained in the amended paragraphs, these surfaces 334 & 341 are forced coplanar or physically engaging when the electronics drawer is slid horizontally into a docked position as shown in FIG. 4A, thereby facilitating transfer of heat from the first liquid cooling subsystem to the second liquid cooling subsystem.

Paragraph [0023] is amended to specify that each electronics drawer slides horizontally in a sliding direction 401 (as shown in FIG. 4A) into a docked position, and in the docked position biasing springs 336 (shown in FIG. 3) apply a biasing force to the first fluid cold plate in the embodiment of FIG. 3. (In the embodiment of FIG. 5, the biasing springs apply the biasing force to the second fluid cold plate, i.e., cold plate 540.)

To summarize, the above-noted specification amendments simply characterize further the assemblies depicted in FIGS. 3-5, and better correlate the elements depicted in the assemblies with the language of Applicants' pending claims.

With respect to claims 4-5, Applicants respectfully submit that the first cooling subsystem includes a first cold plate 335 (FIGS. 3 & 4A), and that cold plate 335 has a first planar heat transfer surface 334 (FIG. 4A) comprising a main planar surface of cold plate 335 as shown. It is respectfully submitted that element 335 represents the cold plate itself, while the heat transfer surface 334 is a planar main surface of element 335. A similar clarification is provided in FIGS. 3 & 4A and paragraph [0021] for the second cold plate 340 having the second planar heat transfer surface 341. Based on these clarifications, withdrawal of the rejection to claims 4 & 5 is respectfully requested.

With respect to claims 6 & 7, Applicants have herein amended claim 6 to remove the language at issue, and to more clearly recite certain concepts of independent claim 1. Specifically, each independent claim recites that at least one of the first fluid cold plate and the second fluid cold plate moves horizontally relative to the electronics drawer as the electronics drawer is slid horizontally into a docked position in an electronics rack. In the embodiment of FIG. 3, cold plate 335 projects a distance out the opening in the back of the drawer, and as the drawer is slid horizontally into a docked position (see FIG. 4A), cold plate 335 engages cold plate 340, thereby compressing springs 336, which in turn forces cold plate 335 into good thermal contact with cold plate 340, with the planar main surface 334 of cold plate 335 and the planar main surface 341 of cold plate 340 forced coplanar or physically engaging to facilitate the transfer of heat from the first liquid cooling subsystem to the second liquid cooling subsystem (see amended paragraph [0021]). Further, as shown in FIG. 4A, the first planar heat transfer surface 334 and the second planar heat transfer surface 341 are each disposed perpendicular to the horizontally sliding direction 401 of the electronics drawer. The orientation of these surfaces remains as shown originally in the application as filed, and the amendments to the claims and specification paragraphs clarify the depicted assembly. Based on these amendments, withdrawal of the rejection to claims 6 & 7 is requested.

Although claim 10 has been canceled herein without prejudice, it is respectfully submitted that the second planar heat transfer surface is an exterior surface that is a main planar surface of the system cold plate. For example, reference surface 341 of cold plate 340. One embodiment of a system cold plate 540 reciprocating horizontally in the sliding direction of the electronics drawer as the drawer is docked in and undocked from the electronics rack is depicted in FIG. 5. System cold plate 540 is positioned and springs 550 are sized so that when the electronics drawer is docked, cold plate 530 contacts cold plate 540 and causes the springs 550 to compress. The reaction force due to the compressed springs provides the mechanical force which ensures coplanarity between or physical engaging of the first planar heat transfer surface of cold plate 530 and the second planar heat transfer surface of cold plate 540 (i.e., the surfaces are in opposing relation). In this regard, see amended paragraph [0025].

For the above-noted reasons, reconsideration and withdrawal of the 35 U.S.C. §112, second paragraph, rejection is respectfully requested.

35 U.S.C. §102:

Claims 1-20 were initially rejected under 35 U.S.C. §102(e) as being anticipated by Faneuf et al. (U.S. Patent No. 6,836,407; hereinafter Faneuf). This rejection is respectfully, but most strenuously, traversed to any extent deemed applicable to the claims presented herewith.

As recited in amended claim 1 (and depicted in FIGS. 3 & 4A), for example, Applicants' invention comprises a thermal dissipation assembly which includes a first liquid cooling subsystem disposed substantially within an electronics drawer 300 and positioned to extract heat from a heat generating component within the electronics drawer. The first liquid cooling subsystem includes a first fluid cold plate 335 with a first planar heat transfer surface 334. The assembly further includes a second liquid cooling subsystem that is disposed external to the electronics drawer. The second liquid cooling subsystem includes a second fluid cold plate 340 with a second planar heat transfer surface 341.

At least one of the first fluid cold plate 335 and the second fluid cold plate 340 moves horizontally relative to the electronics drawer 300 as the electronics drawer is slid horizontally in a docked position in an electronics rack 400. The first planar heat transfer surface 334 and a

second planar heat transfer surface 341 are each disposed perpendicular to a horizontal sliding direction 401 of the electronics drawer as the electronics drawer is slid into the docked position in the electronics rack. A spring biasing mechanism 336 is provided for mechanically forcing the at least one moveable first fluid cold plate 335 or second fluid cold plate 340 into physical contact with the other of the first fluid cold plate and the second fluid cold plate, with the first planar heat transfer surface 334 and the second planar heat transfer surface 341 engaging when the electronics drawer is in the docked position in the electronics rack to facilitate the transfer of heat from the first liquid cooling subsystem to the second liquid cooling subsystem. The spring biasing mechanism 336 compresses in the sliding direction 401 as the electronics drawer is slid into the docked position. This applies a biasing force against the at least one moveable first fluid cold plate 335 or second fluid cold plate 340 that is perpendicular to the first planar heat transfer surface and the second planar heat transfer surface when the electronics drawer is docked. Note that the movability of the second fluid cold plate is depicted in FIG. 5 (i.e., second fluid cold plate 540 is moveable and biased by spring biasing mechanism 550). Applicants respectfully submit that this assembly recited in amended claim 1 is clearly distinct from the teachings and suggestions of Faneuf.

It is well settled that there is no anticipation of a claim unless a single prior art reference discloses: (1) all the same elements of the claimed invention; (2) found in the same situation as the claimed invention; (3) united in the same way as the claimed invention; and (4) in order to perform the identical function as the claimed invention. In this instance, Faneuf fails to disclose various aspects of Applicants' invention as recited in the independent claims presented herewith, and as a result, does not anticipate (or even render obvious) Applicants' invention.

Faneuf illustrates in FIG. 3 the components of a server unit subassembly 24. The server unit subassembly includes a computer chassis 54, a circuit board 56, an electronic component in the form of a central processing unit processor 58, and an evaporator unit loop 60. The circuit board 56 is secured on a base of the computer chassis 54. The processor 58 is secured on the circuit board 56. The evaporator unit loop 60 includes an evaporator unit 62, a hot vapor pipe 64, a cold liquid pipe 66, and a chassis-level thermal interface component 68. The chassis-level thermal interface component 68 is a wedge-shaped structure, as shown in FIG. 3, and is designed to mate with a frame-level thermal interface component 36 when the server unit subassembly 24 is inserted into the frame. (See Abstract of Faneuf, and column 3, lines 14-41.)

Initially, Applicants note that various aspects of the structures/methods of their amended independent claims are simply not taught or suggested by Faneuf. For example, in each independent claim presented, Applicants recite that *at least one of the first fluid cold plate and the second fluid cold plate moves in a horizontal direction relative to the electronics drawer as the electronics drawer is slid horizontally into the docked position in the electronics rack.* In contrast, a careful reading of the Faneuf patent fails to uncover any suggestion that interface component 68 and/or subcomponent 36 moves relative to the electronics drawer as the drawer is slid into a docked position in the electronics rack. To the extent the issue is described, Faneuf actually teaches away from such a possibility. Specifically, at column 4, lines 43-49, Faneuf states:

> ... A bracket 101 mounts rear ends of the pipes 64 and 66 in a relatively stationary position. The bracket 101 substantially disallows movement of the chassis-level thermal interface component 68 in a horizontal direction, while still allowing for a small amount of vertical movement of the chassis-level thermal interface component 68, relative to the computer chassis 54.

Since Faneuf expressly teaches disallowing of any movement in the horizontal direction, and since Applicants expressly recite the opposite, i.e., that one of the first fluid cold plate and the second fluid cold plate moves in a horizontal direction relative to the electronics drawer, it is respectfully submitted that their recited claims would not have been anticipated by, nor rendered obvious in view of, the system of Faneuf. For at least this reason, reconsideration and withdrawal of the anticipation rejection based thereon is requested.

In addition, Applicants recite in the independent claims presented that the first planar heat transfer surface of the first fluid cold plate and the second planar heat transfer surface of the second fluid cold plate are each disposed perpendicular to the sliding direction of the electronics drawer as the drawer is slid horizontally into the docked position in the electronics rack. No similar structure is taught or suggested by Faneuf. In Faneuf, the thermal interface component 68 and the thermal interface subcomponent 36 each comprise angled surfaces which are configured to mate when the server unit subassembly is inserted into the frame. In Applicants' recited structure, the first planar heat transfer surface and second planar heat transfer surface are perpendicular to the horizontal sliding direction of the electronics drawer, and physically engage (i.e., become coplanar) with the docking of the electronics drawer in the electronics rack, which provides a greater degree of tolerance than is possible with a system such as taught by Faneuf.

Still further, Applicants' independent claims recite the existence of a spring biasing mechanism for mechanically forcing the moveable first fluid cold plate or second fluid cold plate into physical contact with the other of the cold plates. When forced into physical contact, the first planar heat transfer surface and the second planar heat transfer surface engage to facilitate the transfer of heat from the first liquid cooling subsystem to the second liquid cooling subsystem. Applicants' independent claims more particularly recite that this biasing mechanism compresses in the sliding direction when the electronics drawer is slid into the docked position, and thereby applies a biasing force against the moveable first fluid cold plate or second fluid cold plate that is perpendicular to the first planar heat transfer surface of the fist fluid cold plate and perpendicular to the second planar heat transfer surface of the second fluid cold plate when the electronics drawer is docked.

In comparison, Faneuf fails to teach or suggest any spring biasing being applied against thermal interface component 68 or frame-level thermal interface subcomponent 36. The Office Action analogizes any movement of bracket 101 as resulting in a spring biasing. However, Applicants respectfully submit that Faneuf teaches away from such an interpretation by indicating that bracket 101 substantially disallows movement of the chassis-level thermal interface component 68 in the horizontal direction. (See column 4, lines 43 & 44.) In accordance with Applicants' invention, the spring biasing mechanism compresses in the sliding direction (i.e., in the horizontal direction) as the electronics drawer is slid into the docked position. This compressed spring then applies a biasing force against the moveable first fluid cold plate or second fluid cold plate that is perpendicular to the first planar heat transfer surface and the second planar heat transfer surface of the cold plates when the drawer is closed. No similar biasing force is possible with the structure of Faneuf.

To summarize, Applicants respectfully submit that the assemblies recited in their independent claims present numerous advantages over a heat transfer approach such as described by Faneuf. In Faneuf, a force-fit is employed, along with the angled designs of the thermal interface structures and required close tolerances, to achieve the desired physical coupling. In contrast, in Applicants' approach, one of the cold plates reciprocates in a horizontal direction relative to movement of the electronics drawer and essentially floats with its position being determined, in part, by the spring biasing mechanism pushing against the moveable cold plate as the electronics drawer is docked. With Applicant's approach, mechanical tolerances do not have

to be tight between the electronics drawer and the rack frame. The moveable and spring biased cold plate configuration thus readily allows for manufacturing differences.

For at least the above reasons, Applicants respectfully submit that the amended independent claims patentably distinguish over the teachings of Faneuf. Withdrawal of the rejection based thereon is therefore respectfully requested.

The dependent claims are believed patentable for the same reasons as the independent claims from which they directly or ultimately depend, as well as for their own additional characterizations.

Applicants' attorney is available at the below-listed number to discuss this application further with the Examiner. However, the application is believed to be in condition for allowance, and such action is respectfully requested.

Respectfully submitted,

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ANNOTATED SHEET

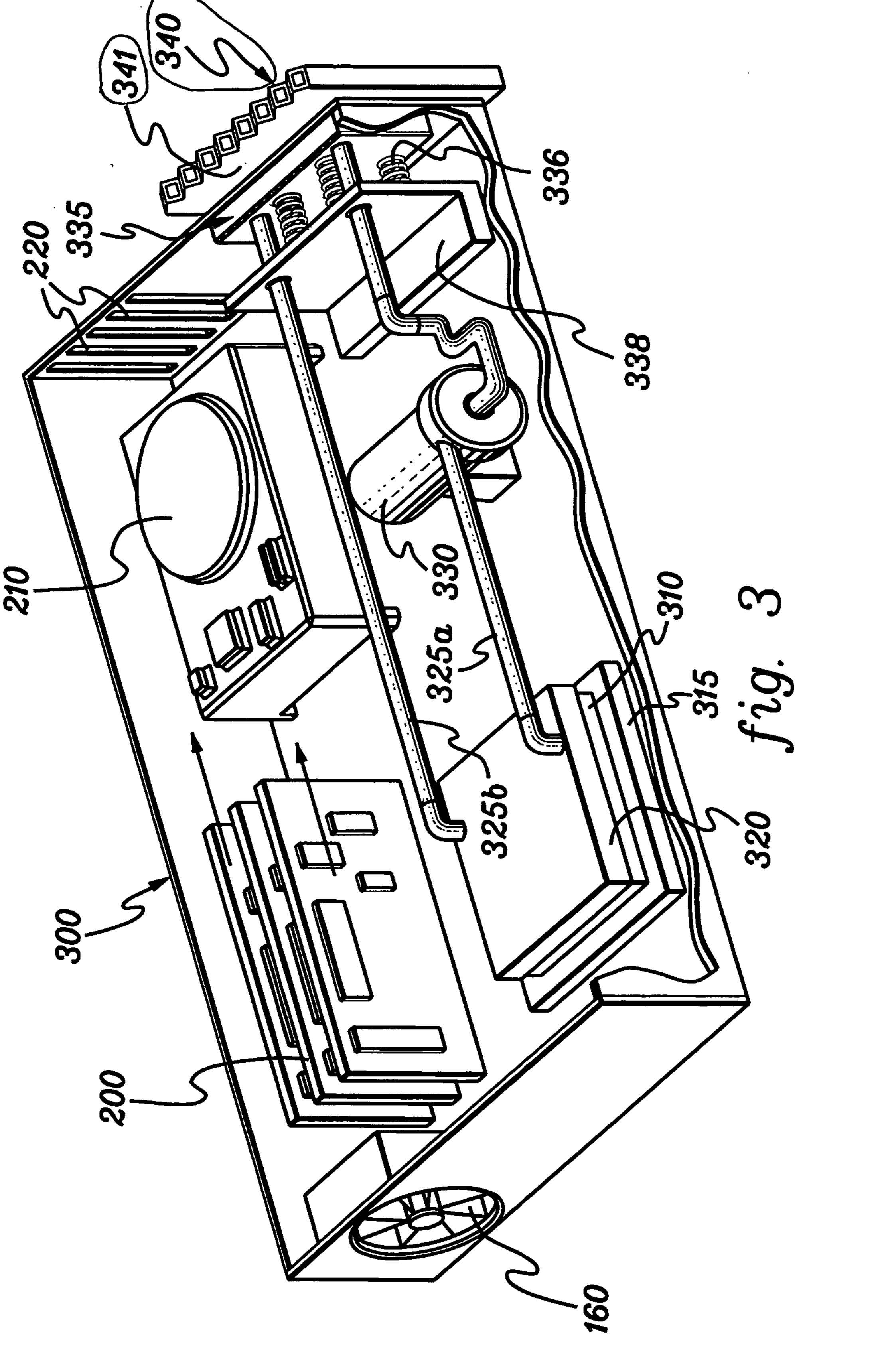

fig. 3

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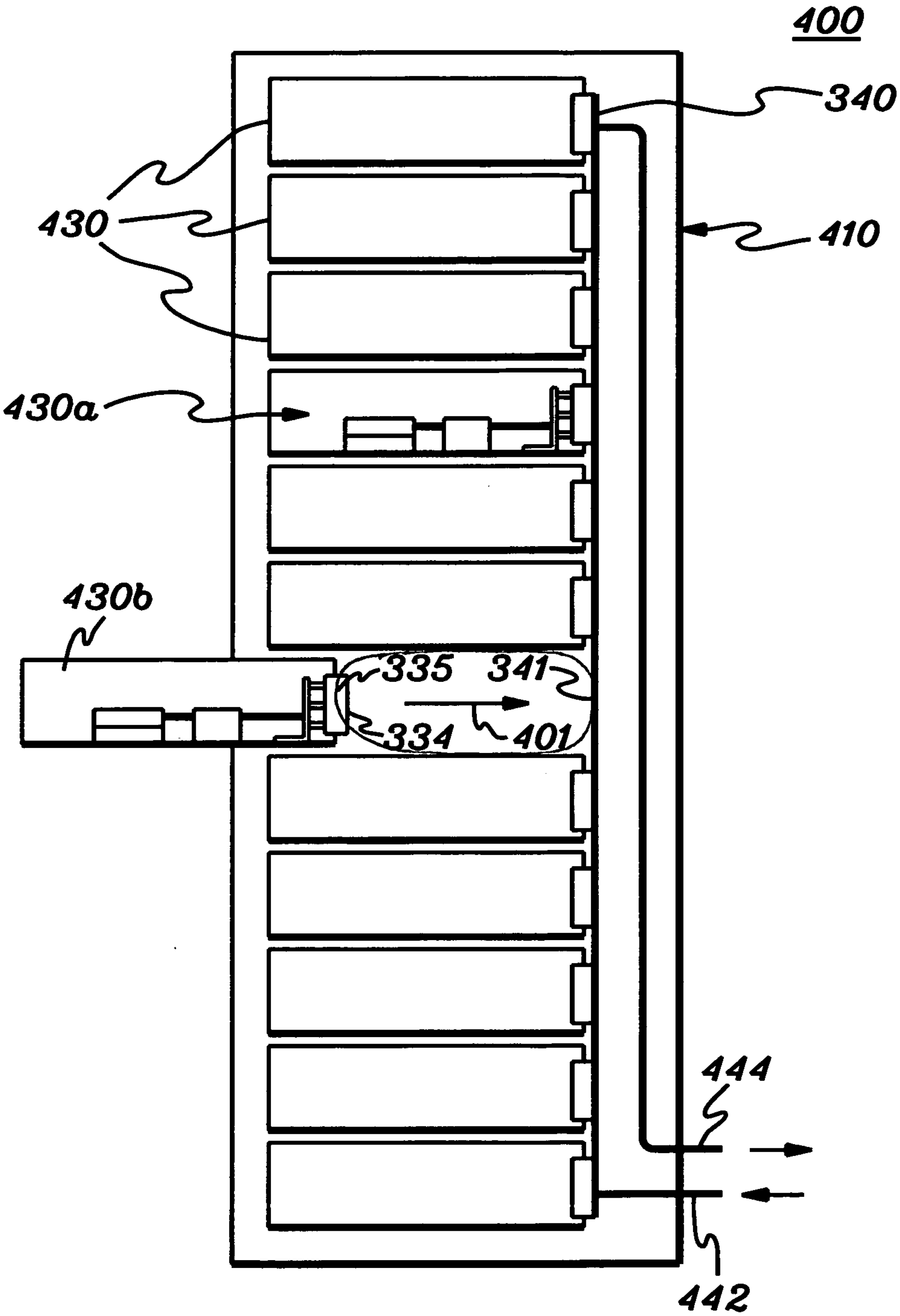

fig. 4A